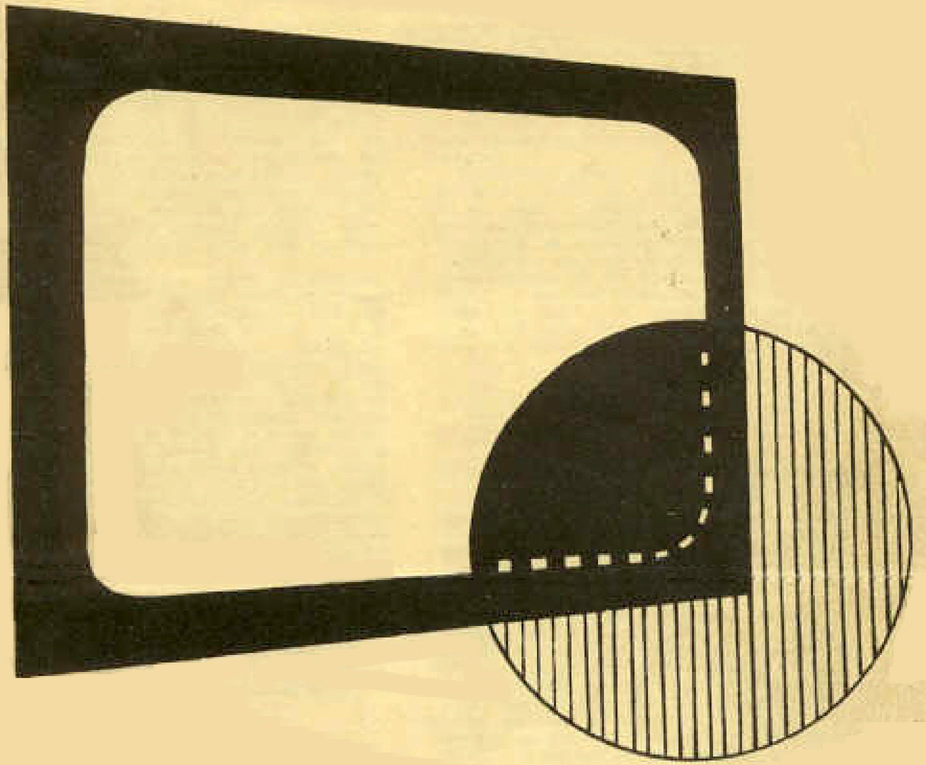


cq-tv

THE BRITISH AMATEUR TELEVISION CLUB

The British Amateur Television Club was founded in 1949 to co-ordinate the activities of amateur radio enthusiasts experimenting with television transmission, and to exchange information with other enthusiasts at home and abroad similarly engaged. The Club is affiliat to the Radio Society of Great Britain.

Experiments carried out by BATC members have been both over a closed circuit (i.e via a cable) and also over the air. Due to the complexity of the equipment required, very few members have the resources to build both sorts of equipment, and the majority are broadly divided into those who transmit good pictures over a cable, and those who transmit some sort of picture over a radio link, being more interested in the link side. From time to time public demonstrations are given by various demonstration teams of the Club. In order that this can be done, and also to permit any member's units to feed into any other member's units, certain Club standards have been recommended. A list of these is given inside the back cover of this magazine.

To transmit pictures over the air, members must hold GPO Television Transmitting Licences costing £2 per annum. The qualifications required are the same as for the normal amateur sound licence, but no morse test is required. Full details can be obtained from the Radio and Accommodation Department, GPO, St. Martin le Grand, London EC1. The licence also covers the use of a sound channel provided this is also in one of the television bands, and is not used except as an accompaniment to the vision signals. The vision bands are 425-455 Mc/s (70 cms), 1220-1295 Mc/s (25 cms), 2305-2445 Mc/s (13 cms), 5655-5845 Mc/s (6 cms), and 10,005-10495 Mc/s (3 cms); a maximum input to the final stage of 150 watts at peak white is permitted. Holders of ordinary amateur licences wishing to transmit pictures also require the /T licence, which is automatically issued on payment of the extra £2 charge.

Camera tubes are not normally available in this country, but the Club has arranged for the supply of a Vidicon type tube, rejected by the manufacturer for minor blemishes, at £25. Monoscopes are similarly available at £7-10-0, but both types are only available in the United Kingdom. Application forms can be had from the Assistant Secretary. Other camera tubes are occasionally advertised in the columns of "CQ-TV". Because of camera tube expense, flying spot scanning (FSS) both telecine and telestill, have received much attention from members. Using a 5FP7 scanner tube, and a 931A photocell, it is possible to televise transparencies with a resolution of 2.5 Mc/s for as little as £10.

Although not attempting to compete with professional laboratories, there are various enthusiastic research groups amongst the Club members. The colour tv group has obtained some very good pictures over a closed circuit, for instance. Some Club landmarks have been: May 1952 - the first ever two-way amateur TV contact (G3BLV/T-G5ZT/T); August 1953 - G2WJ/T received by G3GDR over a record distance of 34 miles; December 1953 - first amateur colour TV transmission.

As there is very little literature available that covers amateur requirements, the Club issues a quarterly magazine "CQ-TV" free to members. This contains circuits and notes, besides a list of current references. A few back copies are available from the Honorary Secretary at 1/6d each post free. In time the Club hopes to be able to produce a little booklet on Amateur TV, and to this end some pages of CQ-TV will be seen to have two numberings, one for the relevant issue, and one for this booklet. The Hon. Treasurer carries a stock of sundries - headed note-paper, club badges, membership certificates, QSL cards, and so on. Loans of films, posters, photos, lecture notes, recorded tapes, and equipment, can be arranged for demonstration purposes.

Club meetings are held on a local basis, and up to the minute information will be found in "CQ-TV". Meetings are sometimes held on the air, and details will be found in "CQ-TV".

Membership costs five shillings per annum, or the equivalent in local currency, payable on the first of January. New members are asked to enclose 6d per month remaining of the old year, plus 5/- for the following year. First subscriptions are receipted directly, but thereafter receipts are normally sent out with "CQ-TV". A membership application form will be found inside the rear cover.

The officers of the Club are:

President: Sir Ernest Fisk.
Chairman: C.Grant Dixon, M.A. 23 Wye St, Ross-on-Wye.
Hon. Secretary: D.W.Wheele, Grad.I.E.E, G3AKJ 56
Burlington Gardens, Chadwell Heath,
Essex.
Hon. Treasurer: L.A.F.Stockley F.B.O.A, F.S.M.C, G3EKE
154 Charminster Rd, Bournemouth, Hants.
Hon. Editor: M.W.S.Barlow, B.A, Grad.I.E.E, G3CVO, 10
Baddow Place Ave, Gt. Baddow, Essex.
Assistant Secretary and Editor: D.S.Reid, B.A, 4
Bishops Rd, Chelmsford, Essex.
Committee: F.Rose Grad.I.E.E G3BLV, 16 North Bridge
St, Sunderland.
Ian Waters BRS 17902 14 St Mary's St, Ely.
W.E.Hall esq, 11 Gransden Rd, London E8.

Technical enquiries are answered by the Technical Group (S.A.Es please) as follows:

Vidicon/Staticon cameras: D.Hooper G3ICU 42 Casselden Rd, London NW10.
Iconoscope cameras: D.Wheele (address above).
CPS cameras: C.G.Dixon(.. ..).
Colour TV: C.G.Dixon(.. ..).
Monoscopes: N.Harris 95 Fawe Park Rd, SW15.
Telecine: J.Woodfield G3HMK 77 Manchester Rd, Wilmslow, Ches.
Pulse Circuits: D.S.Reid (address above).

CQ-TV

At least five shillings per annum.

Number Twenty-Four

24/2 Sixth Year

Published for the British Amateur
Television Club at 10, Baddow
Place Avenue, Gt. Baddow, Nr.
Chelmsford, Essex.

Editorial

As mentioned in the last edition, the new style of printing has thrown rather a strain on the Club's financial position. We had hoped to include a Financial Statement from the Hon. Treasurer, but owing to a sudden domestic change of home, he has been unable to prepare it in time for this edition. All Club members will, however, wish to join him in thanking those who so kindly sent something more than their subscriptions. The majority of members have co-operated fully with the plan of having all subscriptions renewable on January 1st, for which all the Club "staff" are very grateful. We are just as anxious as you to try out that new circuit - and a mass of paperwork doesn't leave very much time.

Messrs. Belling-Lee regret that they cannot see their way to allowing us trade discount on their plugs and sockets. Members wishing to purchase Mazda 27M2 photocells (equivalent to the 931A) should first contact the Assistant Secretary, when they will hear something of advantage. Philpotts Metalworks has very kindly offered a quantity discount on camera cases suitable for staticon tubes and we are enquiring about 15" racks.

A suggestion has been put forward that we should hold a Dinner later in the year. London is suggested, 7/6 or 10/- to pay, and a Friday or Saturday evening. Your comments and suggestions are invited, particularly as to whether or not the meeting should be in the nature of a "Get-Together", or if we should invite a Guest Speaker.

It is hoped that the new covers will meet with approval. There is space for advertising, and they will save the cost of separate application forms.

The success of the local group at Chelmsford, where monthly meetings are attended by members from considerable distances as well as the "locals", shows the need for, and support likely, for similar ventures elsewhere. G. Higgins of 9 Cavendish Rd, Chorlton-cum-Hardy wishes to hear from Lancashire and Cheshire members interested in meetings. He has paid a visit to A. Bevington of Bradford, who is shortly moving to Birmingham. As there are two /T stations already in Birmingham, plus seven or eight other members, there should be a group forming there very shortly. During the summer, the Hon. Editor may make a flying trip round the groups to see what is going on. Remeber that NOW is the time to start preparing for that demonstration in the summer.

Yours sincerely,

Margaret Barker.
Hon Ed.

PROPOSED ADDITIONAL BATC STANDARD

Intercommunication systems.

The suggested standard is described briefly amongst the list of standards inside the rear cover of "CQ-TV". Due to the wide level of audio output obtained when different types of microphone and headset are used, it is suggested that some form of amplification be used where more than two sets of equipment are being used. The central talk-back unit indicated may, for small systems, merely feed the microphone outputs through a transformer into the headsets, but for larger installations a small amplifier will be provided centrally which will amplify the mic outputs and also mix in Programme Sound (P.S) for cueing, and Producer's Talk-back (PTB), the latter being of a higher quality than the rack-to-camera and vice versa circuits for easy identification. Operators microphones should be normal carbon GPO type, and headsets low impedance variety. A 10K series potentiometer can be used as an operators headset volume control, as sound output (mixed TB) will be at a fairly high level. 6V cue lights will be connected from the cue line to ground. If the operator wishes to call the producer or to signal, a shorting switch (push button type) across the speech lines will trip a relay in the central TBU, so lighting a "call" lamp on the production unit. No indication will be given of the particular operator calling, but this is not felt to be necessary; the call-back system should not normally be necessary unless due to understaffing, the producer is likely to be called away from his console. Cue lamp selection is performed by the Vision Mixer Panel switching. A suitable CTBU and Mixer panel are already available for exhibition use, but will only be needed for large semonstrations involving two or more picture sources.

Television Power Supplies Contd.

The two requirements of high μ and high G_m are not usually found together in one valve. In particular high μ valves tend to have a higher voltage drop across them, so that less current can be drawn before the dissipation is exceeded. Pentode stabilisers can be used, but these require a separate supply for their screens, which is not very convenient, unless the load current is nearly constant. The only real answer is the extravagant one of using a series stabiliser for isolation from mains variations, and a shunt stabiliser for isolation from load variations.

The relevant figures for commonly used valves are shown in Figure 5, from which it will be seen that for freedom from mains variations the EL37 is the best valve in a series stabiliser, whilst for low Z_0 the 6AS7 is better. A good all-rounder is the 12E1. These valves all give a good current at a reasonable voltage drop, but the commonly used 807 and 6L6/KT66 show up rather badly on all counts.

Valve	All triode connected	G_m	μ	V_{h-k}	I_a	at V_a	at V_g
6AS7		15	2	300	250	100	-25
EL37		6	9	75	150	150	-4
12E1		14	4	300	200	150	-10
6CD6		6	3.5	135	150	100	-8
EL81		10	5	100	150	100	-3
KT66		5	6	100	90	150	-1
807		5	2	135	75	150	-1

Figure 5: Figures for some commonly used stabilisers.

Care should be taken that the heater-to-cathode voltage is not excessive, especially where both amplifier and stabiliser valves are fed from the same heater supply. One side of the heaters can be joined to a convenient DC potential via a 680K resistor. In Figure 6, such a connection is made to the cathode of V1.

A point that often arises with stabilised power supplies is whether or not full HT smoothing should be incorporated. This is akin to the problem of mains variations, and it will be seen that the ripple will be reduced by a factor of $1/\mu A$ approx. (Circuits will be found in the references for giving much less output ripple with very little input smoothing). However, it may be that the whole action of the amplifier is taken up in correcting the ripple, in which case less will be available to correct for load or mains variations. In general a choke input filter should be used, with at least 4mfds smoothing, and more if possible.

Typical Design for a Stabiliser

All the component values will now be worked out for the stabiliser of Figure 6, so that the general scheme can be applied by readers to their own problems.

The input supply is 375 volts, the output is to be 250 volts at 250mA; the series stabiliser is a 6AS7 (both halves in parallel), and the output is to be both stable and of low impedance.

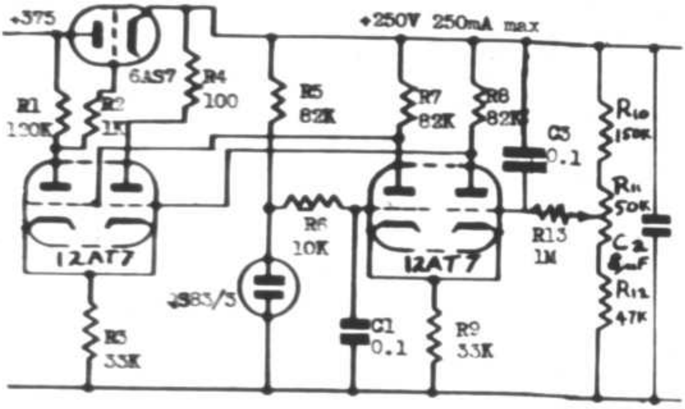


Figure 6: The Complete Stabiliser Circuit.

Considering the 6AS7, it must pass 250mA at full load, and the voltage drop across it will be 125 volts. This is within the rated maximum dissipation of 25 watts. The bias required here is -40V with respect to the cathode, so that V1a anode is at +210V, and there is 375-210=165V across R_1. V2a grid is at 83V due to the neon (C1 and R6 act with C3 and R13 to reduce output ripple); V2 cathode will therefore be at about +85V. The anode of V2a is at the same potential as the grid of V1a, which will be nearly the same as the cathode of V1. Assuming the available voltage is divided equally between V2a and V1a, each will have(210-85)/2 = 63V between anode and cathode. The maximum current that can be passed without grid current flowing at this anode voltage is about 1.4mA (12AT7). R_1 is therefore 165/1.4 = 120K. V1 cathode is at 210-63 = 147V; R4 is a small stopper so that V1b has 250-147 = 103V across it. The maximum current it can pass is 3mA, making the total V1 current 4.4mA; R3 is therefore 147/4.4 = 33K (1w). With equal loads in the anodes of V2, equal currents will flow. Each anode is at 147V, so that the drop across R7 and R8 is 250-147 = 103V; for a current of 1.4mA each resistor is therefore 83K. With V2 cathode at +85V or so, and a total of 2.8mA flowing, R9 must be 85/2.8 = 33K. For 2mA of neon current, R5 is(250-85)/2 = 82K. V2b grid requires to be in the range say 75-95 volts, so that R10,11 and 12 may be 150K, 50K and 47K. C2 is at least 8mfds to ensure a low Z_0 at higher frequencies. R2 is a grid stopper on the 6AS7, which may need 10 ohm anode stoppers as well if spurious oscillations are to be avoided. V1 may also need 1k grid stoppers.

Measurement of output impedance is difficult, but the full load current should not produce any noticeable change of volts on an AVO, say. The best check is to see that the ripple on the HT line is less than 2mV on the oscilloscope. If this is not so, or if the output voltage cannot be set to 250V, then one of the control valves is either taking grid current or is cut-off, and the components may be varied to correct this.

CATHODE FOLLOWERS

By Don Reid.

There seems to be a lot of confusion about cathode followers in particular, and unit interconnections in general. Referring readers to CQ-TV No 21 P8 for the background, it will be recalled that in order to send a waveform down a long cable without distortion, it is necessary that the cable "be accurately matched at each end". Consider this in more detail.

The usual cable used for television work is a co-axial cable of 75 ohms characteristic impedance. This impedance is a function of the ratio of inner to outer diameters, and comes out at 75 ohms for the ratio giving the least attenuation in the cable. If the cable is terminated at the far end with a pure 75 ohm resistance, no matter how long it is it will appear to be just a 75 ohm resistance at the near end. The generator has to produce 1 volt across this 75 ohms (BATC standards). This means a current change of about 13 mA in the 75 ohms, and , since transformers cannot be used due to the bandwidth involved, the 75 ohms must be directly connected to the generator as its load. It should not be necessary to have a physical 75 ohms at the transmitting end of the cable unless the cable is very long; note that putting such a resistor in reduces the AC load from 75 ohms to 37.5 ohms, and 26mA will be needed to generate one volt across it.

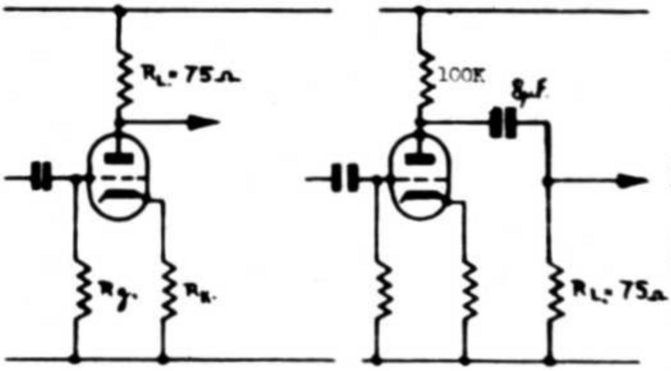


Figure 1 (a) and (b).

Consider Figures 1a and b. In **a**, R_1 for the valve is 75 ohms directly. Since this is extremely low, the stage will give no gain, in fact some 4 volts of input is needed to develop one volt of signal across the load. In addition, the 75 ohms is all at HT potential, which is inconvenient if a cable is being used, and also any ripple on the HT line will be superimposed on the 1 volt signal, and may be a large proportion of it. At b, R_1 has been increased to 100K or so, the coupling condenser only needing to be 8 mfds for quite a good coupling time constant, and the 75 ohms is now to earth. As far as the valve is concerned, its AC load is still 75 ohms, so that the gain is still about 0.25, but 4 volts input now will drive the valve into distortion, and the circuit can only be used for pulses, where clipping of tops and bottoms is unimportant. The DC and ripple troubles have been eliminated, and the circuit is very useful where a phase-reversing low impedance output stage is required for PULSES ONLY.

To handle vision signals proper without distortion, a cathode follower must be used (see Figure 2). This is a power amplifier, the input being at high impedance (some 10 times the value of the grid leak R_1) and the output at low impedance (roughly $1/g_m$ for the valve). There is no phase inversion, and no DC or ripple trouble. The stage can in fact be designed to have its cathode at any desired DC potential, a point of importance in modulators, for instance. The bias for the valve is developed across R_2, and $R_2 + R_3$ must be big enough to give a standing DC potential at the cathode larger than the peak video swing required.

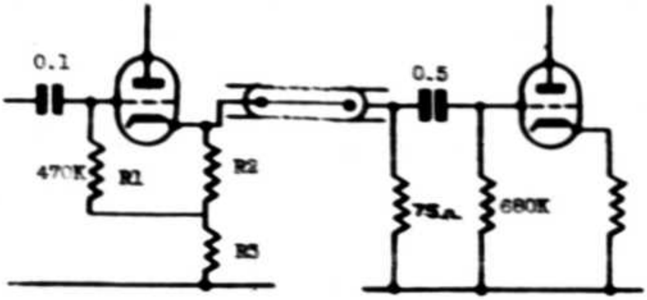


Figure 2: A typical cable run.

The load line for a valve becomes an ellipse if reactance is added to the load, and if the ellipse cuts the axes, distortion occurs. The MAXIMUM capacity that can be handled by a cathode follower is given by:

$$C_{max} = \frac{500}{\pi f}\sqrt{\frac{i^2}{v^2} - \frac{1}{R^2}}$$

when C is in pF, f is the max undistorted frequency that is to be handled, i is the steady DC in mA in the valve, 2v is the peak-to-peak output swing required, and R is the total cathode resistance in kilohms.

Capacity across the cathode load naturally affects the frequency response. The output is 3dbs down at

$$f_{-3dbs} = 159(1+g_m R)/CR$$

when f is in mc/s and g_m in mA/V. Notice that the first equation gives the MAXIMUM capacity that can be used, whilst the second gives the frequency response for whatever capacity (less than C_{max}) is present. For 1 volt outputs, capacity effects are rarely troublesome, but where a large swing of say 50V is required, as in a modulator, they may be. Thus for a 6CH6, with its cathode at a mean potential of 55V, R2 = 180 ohms, R3 = 2.2K, i_a = 25mA, C_{max} is 47pF

(Continued at foot of Page 5)

A NEW 70CM CONVERTER

At a meeting of the Chelmsford group, Tony Sale described his new type of 70cm TV converter . This is unorthodox in its way of matching the aerial input to the crystal mixer, and the crystal output into the IF, by means of a pi section coupler.

Various crystals used for mixing have an input impedance in the range 300 to 1000 ohms, and it is difficult therefore in the usual case of a quarter wave line input tuner to tap the crystal on at the correct place. The point that is correct for one may be some way off for another of similar type. Varying the tap is a tedious business, but one cannot afford a mismatch if the converter is to give the best possible performance. The pi-coupler gives a way of continuously varying the match to suit the particular crystal and circuitry. The same applies to the output impedance of the mixer, which may lie between 300 and 5000 ohms, and must be matched into the impedance of the IF grid circuit.

To avoid aerial feeder losses at 430Mc/s, Tony Sale has designed two versions of the complete converter. One is a standard type, containing mixer, local oscillator and head IF stage on one chassis, and the other is a most interesting type designed to have the mixer right up at the top of the mast immediately behind the aerial, with the local oscillator and IF at the bottom of the mast. Cable losses at 430Mc/s are thus eliminated, since the IF losses are much less in the average cable; loss of local oscillator power is easily made up by increasing the power of the oscillator; crystal current can also be measured at the bottom of the mast by suitable filtering. The system shows great promise, but is not of any use if the aerial is also to be used for transmitting. Figure 1 shows the layout adopted by Roy Martyr, with the circuit underneath. The top of the CV102 crystal is used as a junction for L1 and L2, which are respectively the π-coil at 436Mc/s and a 436Mc/s RF choke. C1 is a DC blocking condenser to prevent crystal current being shorted in the aerial (which should be of folded dipole or similar type to reduce 45Mc/s breakthrough); the π condensers are the stray input capacity, and the capacity of the crystal. C2 may be added if required. C3, L3 and C4 form the 45Mc/s π-section. Either the C's or the L may be varied as preferred. L4 is a 390Mc/s RFC to stop the local oscillator injection escaping to ground via C4. C5 is the injection capacity - a short lead or actual capacitor made of a small disc mounted on a 6BA screw soldered to the end of the output co-ax socket.

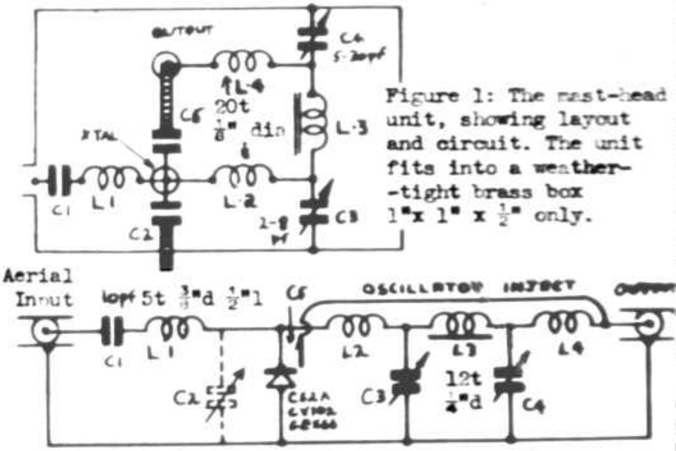


Figure 1: The mast-head unit, showing layout and circuit. The unit fits into a weather-tight brass box 1"x 1" x ½" only.

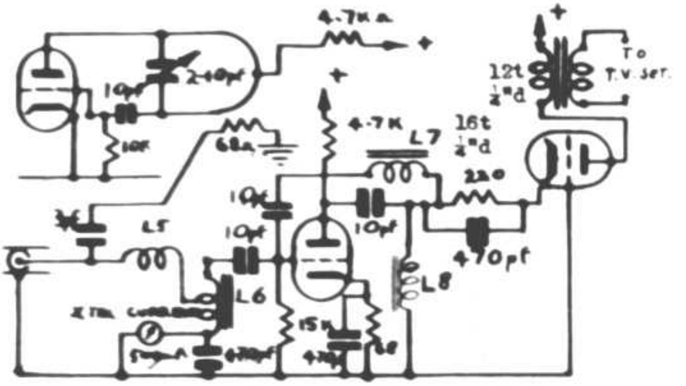


Figure 2: The base unit. For a 12AT7 oscillator, the total length of the tuning loop is 2½".

Figure 2 shows the base unit: the oscillator is one half of a 12AT7, using a line circuit coarsely tuned by a small trimmer. Fine tuning may be done by a small disc on the end of a screw which may be wound in and out near the line. Oscillator HT is adjusted to give about 200μA crystal current under operating conditions. The pick-up loop is formed from a 68 ohm carbon resistor, to match the line and prevent the IF being shorted. L5 is another 390Mc/s RFC, and the output is tapped on to the 75ohm tap on the cascode input coil. The first stage uses a triode connected 6AK5, the second being a 12AT7. Neutralisation is carried out by removing HT from the cascode stages, and injecting a powerful signal at the input co-ax socket. A very small output should be seen on the domestic TV set, and the neutralising coil L7 should be adjusted for minimum signal. Both mixer and base units should be well-screened to stop BBC breakthrough. A GEX66 mixer can be used with some increase in noise; a 6J6 or similar valve would do for the oscillator, and a PCC84/6BK7A or 6BQ7 makes an even better cascode valve.

In the absence of a signal generator, the oscillator can be set to 436Mc/s using a wavemeter (see CQ-TV No. 21) or Lecher Lines, and the 436 Mc/s π-section is adjusted for maximum crystal current. A short length of lead wrapped round the crystal should enable the BBC to be received and the 45Mc/s π-section to be tuned. The oscillator is now put back to 390Mc/s, and the HT adjusted to give about 200μA crystal current with the least possible injection capacity. All is now ready for reception of that first TV signal!

SMOOTH WRINKLES ________!

From time to time we receive enquiries about the use of various CRTs for scanning purposes in Flying Spot Scanners, and we are delighted to give space to a discussion on their merits as reported by several members.

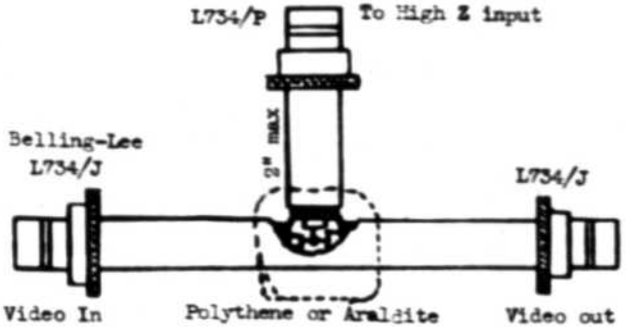
As already generally known, green medium persistence tubes such as the ACR8 Green VCR97, and EMI 4/1 are no use at all. The GEC E4205 E7 blue trace 2¼" diam gives good pictures without any lenses. At 1 to 1.5kV EHT the tube has enough brilliance to scan reasonably thin negatives and positives, but not the more dense ones. The ACR1 yellow trace at 3kV has not enough brilliance except for good clear slides; a lens system is necessary for good definition, but the signal-to-noise ratio is not too good. The VCR516 is a bright blue (plus long yellow afterglow) 9" magnetic tube. This will penetrate dense slides very well, but it is necessary to reduce the scanned area optically by using a lens reduction of some 2.7:1 to obtain really good definition. The signal/noise ratio is good. The VCR 517c gives very satisfactory results; with a 2:1 optical reduction, definition is extremely good, although noise is prevalent in denser parts of transparencies. This would appear to be the best available electrostatic tube (surplus market) for Flying Spot Scanning. Results with the 5FP7 and 5FP7 are similar to those with the VCR517c.

Grant Dixon in the July 1954 "Practical Television" gives some details of the method of adjusting the lens system (if fitted). After setting the slide so that the raster is accurately focussed onto it, the condenser lens is placed as close as possible to it. The slide is then removed, and the position for the 931A is found by moving a piece of white card till the aperture of the first lens is clearly focussed on the card; this is the correct position for the 931A.

HAVE you thought of a way of transmitting the sound accompaniment to our TV pictures without the use of a second transmitter, and yet in such a way that one converter will enable sound and vision to be received on a domestic TV set without any modifications to it at all? Tony Sale has recently come out with some ideas; a burst of 3.5 Mc/s sub-carrier in the back porch, modulated with the sound signals, would do it, but there is difficulty in the frame interval if an interlace is being used. If not, delay the line sync pulses into the back porch (or use shorter pulses) and use these to gate the input from a 3.5Mc/s low power PA. For interlaced pictures, a feed from the vision PA driver could be tapped off to a low-level PA such as a 6J6, modulated with 3.5Mc/s sub-carrier modulated with speech; the 6J6 output (very small) is then coupled into the main aerial feeder with a directional coupler, or simplified diplexer. Frank Lee suggests always transmitting at least 5% carrier, and then using FM for the sound, but this, like the various pulse systems, would mean an alteration to the receiver. We should be most pleased to hear of any experiments performed by members in this direction.

Peter Burrage has sent in some notes on the use of CRTs as "Staticons". He says that most CRTs show the effect to some extent, but that the main snags are very low output, very high noise, poor definition, and the intense illumination required on the face of the crt (the object requires to be lit with a 1kW spotlight at 2', using an f2.9 lens). P.B suggests that various tubes be tried, as he has found a wide variation between tubes and between types. A well-filtered 50 cycle power supply is preferable to any other.

G3AST suggests dunking the end of double-layer scanning tubes in Engineers' Marking Blue solution; he reports a great improvement in contrast. He also suggests the T-piece shown to provide video in-video out paths, as per BATC standards, if an existing unit only has one input:



(Continued from Page 3)

for a maximum undistorted output to 3Mc/s. These figures would serve for a grid modulator for a QQVo6/40 PA.

When a small output is required, half a 12AT7 or a triode connected EF91 is sufficient. With R2 = 470 ohms, R3 = 10K, i_a = 5mA, and Cmax is 250pF for 3Mc/s bandwidth, and 2v p-p output. Note that if the input to a cathode follower is not DC restored it must handle nearly twice the nominal p-p voltage required, due to the change in mean level with signal content.

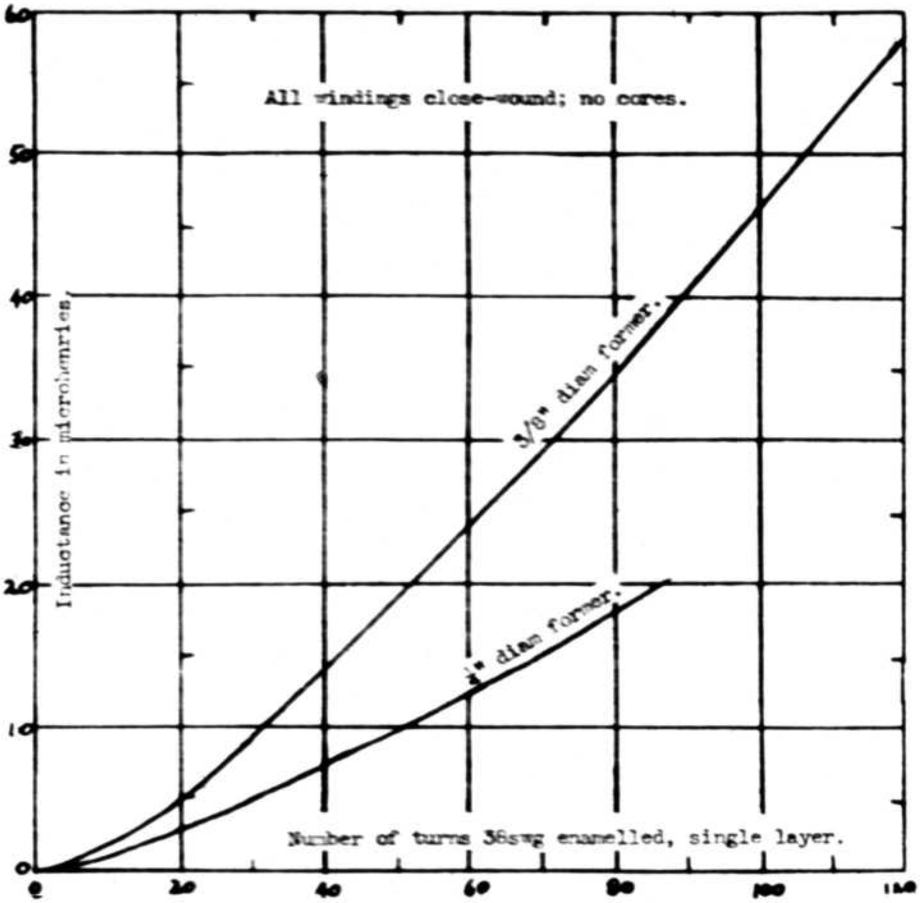
If the voltage across a cathode follower is such as to cause over-dissipation, a dropper may be inserted in the anode lead; 0.1mfd decoupling is sufficient in most cases, or decoupling may be omitted if a loss of CF gain can be tolerated.

One last point is that the far end of a cable usually feeds a grid circuit. This will be of high impedance and does not therefore terminate the cable. Therefore always add a physical 75 (or 68 or 82) ohm resistor; there will be one volt across it, so a coupling condenser and grid leak can be used to transfer it to the grid in the usual way.

References: "Electronics" Nov 1943, Richter.
"Electronic Engineering" Dec 42, Feb and June 1943, Lockhart.
"Television Engineering", Fink.

PEAKING COIL DATA

A constant amplitude input applied to a simple RC coupling is 3 dbs down on its LF output when 2πf = 1/CR, when the slope of the response curve is 6 dbs per octave. If the "R" in question is the anode load of a video amplifier the "C" consists of the output capacity of the amplifier, the input capacity of the next stage, and the stray capacity associated with the wiring and components. A typical figure for the EF91/6AM6 is 20pF, so that for a response 3dbs down at 3Mc/s, the maximum anode load that can be used is about 2.5K, giving a gain (G_m x R_l) for the stage of about 15. If either higher gain or extended frequency response is required, bearing in mind that the overall response of a complete amplifier chain is the sum of the individual responses per stage, then some form of peaking is necessary to counteract the effect of the capacity.



A constant amplitude input applied to a simple RC coupling network is 3dbs down on its LF output when 2πf = 1/CR, and the slope of the response curve is -6dbs per octave. When the "R" in question is the anode load of a video amplifier, the "C" consists of the output capacity of the amplifier, the input capacity of the next stage, and the stray capacity associated with the wiring and components. A typical figure for the EF91/6AM6 is 20pF, so that for a response 3dbs down at 3Mc/s the maximum anode load that can be used is about 2.5K, giving a gain for the stage of (G_m x R_l) = 15. If either higher gain or an extended frequency response is required - bearing in mind that the overall response of a complete amplifier chain is the sum of the individual responses per stage - then some form of peaking is necessary to counteract the effect of stray capacity.

Cocking, in "Television Receiving Equipment", gives a table, and much detail, showing that the three commonly used forms of compensation, namely shunt, series, and composite, give improvements over a simple R-C coupling of the order of 3,4 and 6 times. The latter two are difficult to adjust for optimum conditions, however, and the shunt corrected circuit as shown is the most commonly used. Note that for amateur work, if a response better than 2 Mc/s overall is not required, EF91s with 2.2K loads will give gains of 10-12 without any peaking at all. For shunt compensation, the correct value of peaking coil is given by

$$L = 0.414CR^2 \text{ microhenries}$$

when C is in pF and R in kilohms. This gives the flattest frequency response with a very small over-shoot; if the overshoot is vital, $0.3CR^2$ gives critical damping. A bigger coil will cause severe "ringing" or even sustained oscillation at some frequency within the video band.

The graph shown gives the number of turns required on the two common sizes of Aladdin formers to give a particular inductance. Insertion of an iron-dust core will increase the inductance by some 50-100%.

References: Cocking, Chapter 9.
CQ-TV Nos 6 & 7.

38swg enam. 144 turns/cm.

AMATEUR TELEVISION

WHAT THE OTHER BLOKE IS DOING

By
Vladimir
Pffoudlesnitch

We have had a good number of reports this month, for which many thanks. Remember, your hints and tips and happenings are of great interest and value to other members, so keep in touch, won't you?

G.L.Sharpley writes in with news of ATV activity in the RAF at Yatesbury. They had collected all the parts for a projection type telestill unit and a push-pull CV90 70cm transmitter, but now most of the gang have been posted. G.S is pressing on with his own 5FP7-931A FSS when on leave in Manchester. At the moment 1½ Mc/s is the best he can do, but a new video amplifier should improve things.

George Wynn is now moving to Malvern for some months (C.G.D-land?) and gives a forwarding address at Brentwood. His Staticon has arrived, and he now wishes to part with the 1846 Iconoscope with mount, coils, line and frame transformers, scarcely used. £15 to members. George has started work on the new sync generator chain, and also intends to use 8025s in a p-p MO-PA arrangement,

Ian Waters (Ely-Henlow) has finished his new 70cm converter with two IFs, 16 Mc/s for communications work, and 45Mc/s for TV. The local oscillator is an RF105 unit with a CV82, tuning 380-439Mc/s. Some air-spaced co-ax is to hand, and strenuous efforts are being made to receive G2DUS/T and G2WJ/T at Henlow RAF Station. Ian wants a 500 or 750 watt 230V 50 cs petrol-electric generator; any offers? With a Fiat car in use, Ian has also been visiting local members at weekends.

John Adams (Iver) is one of the more active telecine enthusiasts, and he is building a 16mm machine on the Philco pattern. In this, the film is wrapped round a rotating glass polygon, scanned with a complete raster. It has the advantage that, like the Mechau machine, a picture is produced at all film speeds, whereas EMI-type two raster methods must be running in synchronism. John now has his power supply properly stabilised, but the pulser is mis--behaving as yet; he wishes to be remembered to the Dagenham crew, by the way.

Eddie Barrall at Colchester has been in bad health, and with the pressure of business, has not had a chance to do anything to his TV gear, but hopes to be more active again this Summer.

Rex Boyer at Shefford now has 5kW of studio lighting available for shows, plus two 110 amp AC arcs! The latter do not appear to cause interference to video or RF channels. Rex offers to loan the lot to any member stuck for "a bit of light"...! An FSS power supply unit giving 250V 75mA stab, 500V variable at 10mA for the 931A and 6V at 4A is also available on loan. Many thanks, om.

M.J.Rawley is with the BBC during the week, but at weekends he goes home to Brighton where he is endeavouring to stir up some activity, G5FRG please note!

Frank Lee has a note from the GPO to say that sound accompaniments to vision signals must be in the vision bands, and by A1,2,3, F2 and 3 only, so that pulsed sound channels are not permitted, at least if transmitted separately. No doubt sympathetic consideration would be given to any original ideas.

Fred Rose G3BLV (Sunderland) reports that the 5527 lies dormant, but is NOT for disposal. He has access to a high transmitter site, and wants to put signals into Bradford. H.G.Toombs (Cambridge) has had some success with a 35mm telestill scanner, but is having trouble with the sync mixing circuits (remembered to DC restore before mixing???).

Ivan Howard G2DUS/T (Baldock) has the Test Card C monoscope unit running, and can give demonstrations any time with only two small cases and a TV set. The Staticon camera is on the way, and Ivan will then go back to the 16mm cine scanner using the 5527 as a storage type pick-up tube. The monoscope unit uses 4 SF12/EF91/6AM6 amplifiers, into a cathode follower; two 6SJ7s are used as l and f oscillators, with a 6V6 frame o/p and 6P28 Line o/p stage; 1000V EHT is obtained from an EHT 130 rectifier. With 175V HT on the video amp and TBs, noise is just discernible, but the signal drowns it. Over 3 Mc/s is easily seen and the tube appears to be reject for some small spots only.

At Bishops Stortford, G.Partridge has completed the new miniature 405 line sync generator, and the FSS and 70cm tx are nearly ready. Test patterns have been produced over a closed circuit, and the /T licence is awaited. L.C.Vallis (Barbados) is trying to stir up some activity in the BWI. He is short of gear, but has two NC17 crts and asks if anyone has used them for scanning? His other hobby is cine photography, so L.C.V is another for the telecine group.

Robert Torrens (GI3FWF/T) of Lisburn finds the bootstrap modulator (Jan 53 CQ-TV) good when a hefty signal is required, but prefers grid mod with lower HT requirements for experimental purposes. He has rebuilt the G3BKQ 70cm converter (S.W.M July 54) with the crystal at the "hot" end of the mixer line, and is very satisfied. A G3HAZ 8012 tripler was also tried, but lack of 2m drive spoilt results. Robert normally runs 48W peak white to a 48 ele array, but can also put out 1watt on 12.5 cms. He suggests the Club might start a library of useful books, and offers to start the subscriptions off. Could we have comments on this idea please?

Charlie Newton G2FKZ (Dulwich) has had to rebuild the transmitter power supplies, and complains that the valves are multiplying like rabbits! From New Zealand

NEW MEMBERS

N.B.Campbell	"Glenfalloch", Wey Rd, Weybridge, Sy.
V.Cedar	9 North Drive, Streatham Park, SW16.
D.Charlton	44 Bagslade Moor Rd, Bamford, Rochdale.
L.P.Goddard	43 Carlton Ave, Feltham Middx.
R.F.Hammond	317 Marvels Lane, Grove Park SE12.
J.Harte	Newcastle West, Co. Limerick, Eire.
J.H.Kemp	77 Old Rd, Harlow, Essex.
R.H.F.Lakeman	No.11 Caravan Site, c/o RAF Medmenham Marlow, Bucks.
W.G.McGuffie	Avondale, Cross Lane, Marple, Stockport.
G.A.Moulson	20 Hampton Rd, Southport, Lancs.
N.H.Nathan	Sylvertrees, Broadway, Worcs.
R.H.Parkinson G3BT	198 Draycott Rd, Breasten, Derbys.
B.Partridge	219 London Rd, Bishops Stortford, Herts
R.E.H.Perera 4S7EP	120 De Soysa Rd, Moratuwa, Ceylon.
J.S.Rackett G3EZB	Li-Ann, Boyton Cross, Roxwell, Essex.
M.J.Rawley	92 Eldred Ave, Brighton 6, Sussex.
D.C.Solt TI2DS	Station TIPC, Box 2710, San Jose, Costa Rica.
G.H.L.Thomas	Smugglers Steps, Queens Ave, Beltinge, Herne Bay, Kent.
H.G.Toombs	6 Springfield Rd, Cambridge.
A.W.Turner	389 Broad Lane, Bramley, Leeds.
A.T.Whittaker	14 Pendennis Rd, Heaton Norris, Stockport, Cheshire.
G.D.Wynn	2 The Rope Walk, Nottingham, Notts.

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Changes of Address:

C.H.Banthorpe Rushden Lowswood Close, Northwood, Middx; H.Burton ZL2APC 15 McIntyre Ave, Wellington C4, New Zealand; B.S.Furby, 336 The Terrace, Wellington C2, New Zealand; Joe Howell W4SOD-TV P.O.Box 126, Lumberton, N.C, USA; D.Reid 4 Bishops Rd, Chelmsford, Essex; L.Reid 15 Buxton Rd, Whaley Bridge, Nr Stockport, Ches.; R.Wilkes, 2 Chesterfield Rd, Blackpool, Lancs; H.K.Agarwal, 70 St. Georges Rd London, SE1; Dr M.King, G3MY, Hillcrest Cottage, Thornhill, Bamford, Nr Sheffield, Yorks; L.A.F. Stockley, G3EKE, 154 Charminster Rd, Bournemouth, Hants.

SHORT NOTES

Grant Dixon is now on the phone at Ross-on-Wye 2715; M.Barlow at Great Baddow 2199; L.Stockley at Winton 2641.

The Mullard QQV06/40 has been uprated to give about 90% output at 430Mc/s at 68% efficiency.

C.H.Banthorpe's article "An Experimental Camera Circuit for 405 lines" is a must for all 5527 men. In the July/Sept 1954 Journal TV.Society.

Philpotts small camera cases 35/- each; details from D.Hooper, 42 Casselden Rd, NW10.

GI3FWF/T and others want 5FP7s; G3AST will swap 12" e/s GEC Kinescope white screen for 5FP7.

Teletech Dec 54 gives a crystal osc divider cct for counting down from the Xtal by 10,000-1. Might be useful for 405-1. Tried the RCA6524 on 70cms? For the benefit of Dollar area members, we must point out that there is NO US equivalent of VHF types QQV03/10; 03/20; 06/40. These are like the 832 and 829 but OK to 600 Mc/s. We note the 6SN7 is now available miniature as the 6CG7.

Sale: Pathe 9.5mm Motocamera Zeiss f2.9 as new with ER case £10 o.n.O.

CORRECTION: last edition P6 Fig4; the valve should be an EL37 or similar tetrode or pentode.

MISSED from reading list: "Television Circuit Refinements" C.H.Banthorpe. About 3/6, Norman Price.

COIL DATA for 70CM TX (last edition): L1 25t 22swg 5/8" dia closewound; L2 15t 18swg same diam, 1¼" long; L3 4t 16swg, same diam, ¾" long. EL83=6CK6.

Congratulations: to H.Manoochehri and P.Plowman on their recent weddings. Good luck, oms.

Thanks to all the "Editorial Staff" for help in preparing this edition, especially F.Steed and D.Reid.

H.Burton ZL2APC writes that he has a VCR112 FSS in action running at 245 lines only (??). A rebuild to a 5FP7 is due - and activity in Wellington is low at this time! ZL2RP please note....

In Birmingham, Paul Easery G3KPE/T has found that he is only 10 mins walk from George Flanner G3KBA/T! George is up and about a bit more, and has been on the air with 9.5mm cine (silent, run at 25 fps!) with an ACR1X scanner and two rasters at 25c/s. The tx runs a screen-modulated QV03/10 tripler on 436.8Mc/s, the output being coupled into the 8 ele array via an HF105 unit used as a tunable balun. G3KJO is helping out, and the lads want a 5527 cheap....

Chelmsford area activity is terrific under the boost of monthly meetings. G2WJ/T has been picked up by T.Sale at Rayleigh, who is all ready to pump a picture back again when the licence arrives. 'WJ now has a new 45Mc/s distribution unit, a sound-channel tx on the way, the new 64 ele stack in action, and two tv sets available with built-in converters. (Incidentally second-hand tv sets are always required by members, especially AC only varieties; please write in). T.Sale runs a 6AQ5-6CH6-TT15-pp8012-pp8012 on 438.5Mc/s and can light a 36W car-bulb at peak white. R.Martyr has a corner reflector up 40' and convertors for 70cms and 2m; M.Barlow can get 2WJ's pictures any time, and is building a new power supply for the new vision tx. The 16 ele stack is being raised to 40' and motorised. D.Reid has his camera coils wound; M.Powell is busy with an effects amplifier for inlay and overlay, etc. P.Burrage is making his own Zoom lenses; F.Jackson is threatening another /T station at Danbury Hill.

In Southampton E.Bassett has been making progress too; the old FSS is to have a VCR517c or 5FP7, and a new reg. PSU gives 250V @ 250mA using a 2-stage DC amp (hmm see P2!). E.B is getting a Statioon, and with the help of G2FGD wants to form a group in the area. Any offers?

and 375c

AROUND THE GROUPS

Chelmsford have had an average attendance of 12 per meeting, with one record 55. Lectures have been on "Colour TV" "70CM Converters" and "The NTSC System". Coming are "Flying Spot Scanners" April 14th, "ATV Testgear" and a "Wrinkle Night". Slides of results from Grant Dixon's colour camera have been shown, and reception from G2WJ/T has followed each lecture. Meetings are held second Thurs each month, see G3CVO.

CLUB STANDARDS

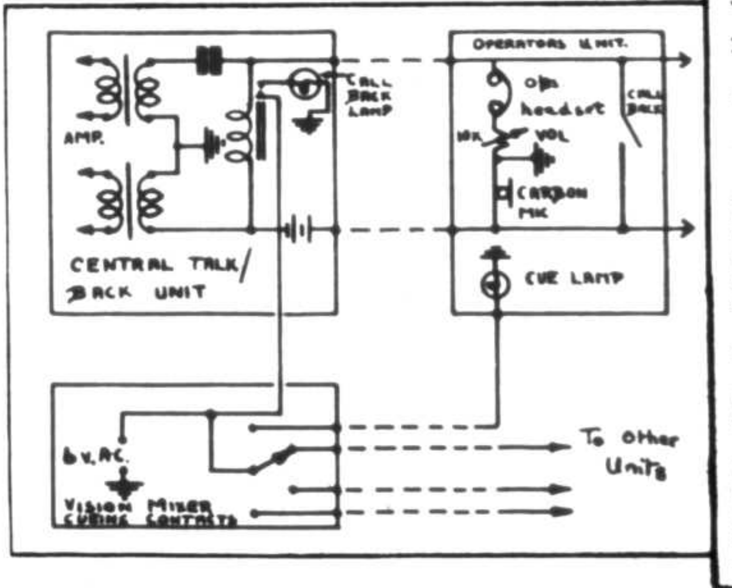
To enable members to run their equipment with units of other members' equipment, certain standards have been recommended by the Committee. You are not, of course, in any way obliged to comply with the standards, but many members are doing so, and all units available on general loan conform to these standards.

Electrical Standards

All outputs 1 volt peak-to-peak across 75 ohms. Composite signals to have white positive, sync negative. Syncs on their own to be negative going. Normally only frame sync, line sync, (or mixed sync), video and composite signals will be supplied or used. Synchronising signals, and general vision standards, to be suitable for feeding into a domestic television receiver adjusted for the reception of BBC programmes. Either 405 line double interlaced or 200 line 50 pictures per second sequential scans may be used.

Studio sound equipment will normally be supplied as a complete unit. Where sound and video are to be distributed at RF, inputs to the sound mixer and/or modulator should be 1 volt across not more than 600 ohms.

Intercommunication facilities: a Central Battery system will be used, each operator requiring a headset and carbon microphone only. Either direct or amplified signals will be used; when amplified, any combination of programme sound, camera-to-control and control-to-camera talkbacks will be available. Normal twin-headsets will be used, these to be provided by the operator with the microphone. A three-wire distribution system will be used, one wire also carrying cue-lamp signals. 6 volt (at least) cue lamps should be used with one side grounded. The microphone and headset should be in series and wired to a terminal block (see below). For call-back a shorting key may be placed across the speech lines.



Mechanical Standards

Either standard GPO 19" racks, or 15" racks to be used (the latter will go in a car).

19" panels to be multiples of 1¾" high, drilled 0 BA (¼") clearance, 7/8" in from ends, 7/8" from top and bottom, 1¾" centres.

15" panels to be multiples of 2" high, drilled 2 BA (No. 10) clearance, ½" in from ends, 1" from top and bottom, 2" centres. Vertical members of rack to be not more than 1⅛" wide at front, 1" preferred, drilled and tapped 0 BA every 1¾" (19") or 2 BA every 2" (15").

Belling-Lee plugs and sockets are preferred, standard sizes for ¼" co-ax. H.T to be at 250V regulated and -150V stabilised; 6.3V AC and 250V AC will be supplied. Inputs to be at the left hand side of the unit viewed from the rear, or wiring, side, with outputs and HT feeds at the right (as in conventional circuit drawing).

THE BRITISH AMATEUR TELEVISION CLUB

MEMBERSHIP APPLICATION FORM

Please fill in this form in BLOCK LETTERS, and send with remittance to the Hon. Secretary, BATC, at 56, Burlington Gardens, Chadwell Heath, Essex.

I, ...(Name)

................(Callsign, etc) of ....

....

............................(address) wish to join the British Amateur Television Club, and I enclose a cheque/PO, payable to the Club, to cover my enrolment. Please send me the next/current edition/any back copies you have of "CQ-TV", and backdate my subscription to cover these.

Signed.............................Date............

Office use G3AKJ/G5KKS/G3CVO Cash Mag
Date replied Ref No.

Overseas members may remit cash by International Money Order, UNESCO coupons, or in local currency as preferred. Typical overseas subscriptions: USA and Canada $1.00; France 250f; Germany DM3; Italy 450 lira; Netherlands f2.50